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2018

18 Years of Science and Engineer Saturday Seminars

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Emery, Chris and Sternheim, Morton, "18 Years of Science and Engineer Saturday Seminars" (2018). *Science and Engineering Saturday Seminars*. 33.

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Science and Engineering Saturday Seminars

Christopher Emery and Mort Sternheim

The Science and Engineering Saturday Seminars (SESS) are in their eighteenth year of presenting engaging science and engineering half day seminars to STEM teachers. Offered for five Saturdays once or twice a year, there have been 140 sessions altogether. The average attendance is 30 or so middle and high school teachers. Each teaches about 100 students, so the potential impact is impressive.

The program is managed by Physics Professor Emeritus Mort Sternheim, Director of the STEM Education Institute (STEM Ed), and Chris Emery, a UMass physics and education alum. Now retired, Chris was an Amherst Regional High School physics and electronics teacher.

Some background: The draft version of the Massachusetts Frameworks for Science, Technology and Engineering was published in 1996, and was followed five years later by the revised version. And, although progress was being made with incorporating the Learning Standards for science, there was still not a clear sense of how teachers should proceed in order to implement the curriculum described by the Technology/Engineering section of the Frameworks at this time. Some of the questions included: “What does technology/ engineering education involve?” “Who is responsible for teaching this material?” and “How will this material fit into the existing school curriculum structure?”

In the Fall of 2000, Mort and Chris met with Kathy Rubin, Associate Dean of the College of Engineering, to discuss the issue. They developed the concept of the Saturday Seminars as a way to assist K12 teachers in making sense of, and creating useable curriculum materials, for teaching this content. The program started with funding from the Raytheon Corporation; when this grant ended, NSF supported the program for a few years. Modest user fees now cover most of the costs.

The goal of the seminars is to provide teachers with background information coupled with lab-based activities that will provide the foundation and incentive for development of teaching and learning materials that can be implemented in the classroom. Saturday programs run from 8:30 AM to 1 PM, and are led by UMass and other Five College faculty as well as by K12 teachers. The presentations typically model an inquiry approach to learning, and include handouts that can be customized for use in designing individualized lesson plans. Most of these materials are posted online and are accessible to teachers everywhere.

The seminars typically include a mix of topics from the physical, biological, and earth sciences, as well as engineering and technology, math, and computer science. Occasional sessions are devoted specifically to pedagogic issues. This year’s list includes Concentration, Amount, and Counting by Weighing; Air Pressure, Clouds and Weather; Engagement and Positive Psychology for STEM Learning and Beyond; Brain Science = Biology + Engineering; and Sustainability.

Teachers have proven themselves very adept at taking one or more ideas from a session having a focus on a specific science or engineering topic outside their area of expertise and teaching

responsibility and adapting it for their specific curriculum. This has occurred across the entire K12 grade level spectrum.

Most of the participants are experienced secondary teachers, although there are often new teachers or science education grad students in the group, as well as occasional elementary educators. Teachers receive Professional Development Points needed for continued certification for attending and participating in the seminars. They also have the option of enrolling in a 3-credit, structured independent study course at a reduced tuition rate. Those who choose the credit option are required to do outside reading as well as to develop a curriculum plan for their students that is based on some learning experience from the seminars. This work culminates with an additional Saturday session for sharing teachers' lesson ideas. Over 300 teachers have elected this option.

Several years ago Education Professor Joe Berger used questionnaires and focus groups to evaluate the SESS program. Some highlights of the focus group report:

Many noted that other teachers in their schools have come to ask them about what they have learned in the seminars, especially regarding the hands-on concrete demonstrations... Participants perceive that this seminar addresses content with inquiry-based techniques and is very valuable because there are a lot of projects out there being passed off as inquiry-based that only keep the students busy, but do not really teach the concepts.

The seminars also provide the "nuggets" to further develop projects. One teacher described how she incorporated some math and science in addition to what she has learned in the seminars and expanded the projects. This person exclaimed that "The kids love it!"

Participating teachers also get ideas from the seminars that they never thought about before in other workshops and seminars. The seminars take the teachers out of their normal teaching style and give them new ideas in terms of how to deliver the material. Other advantages to coming to the seminars is that they are affordable in comparison to many other professional development programs ... The interaction with other teachers is particularly valuable, especially for those who teach in isolation in their schools...

Focus group members also like the flexibility of the graduate credit option in which they can earn academic credit through engaged activity rather than through learning the material strictly from textbooks.

Berger concluded that "respondents were nearly unanimous in their belief that the seminars are outstanding."

It is clear that the short, focused content presentations, coupled with a mix of background information presented by talented seminar leaders and the opportunity for teachers to "practice" working with lab materials is a viable model for school year professional development.

For additional information about the SESS, including a list of presenters and their topics plus many seminar materials, go to www.umassk12.net/sess. These materials and many others from a variety of STEM Ed programs are archived by the library at <https://scholarworks.umass.edu/stem/>. The Scholarworks STEM Ed files have been downloaded by users at hundreds of institutions around the world.